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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/716,222	11/21/2000	Sang Chul Youn	214-169P	9409

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EXAMINER

WEST, JEFFREY R

ART UNIT PAPER NUMBER

2857

DATE MAILED: 09/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/716,222

Applicant(s)

YOUN ET AL.

Examiner

Jeffrey R. West

Art Unit

2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

The second application must be an application for a patent for an invention which is also disclosed in the first application (the parent or provisional application); the disclosure of the invention in the parent application and in the second application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ 2d 1077 (Fed. Cir. 1994). The parent application, 08/970,455, does not provide sufficient support, under the first paragraph of 35 U.S.C. 112, for claims 7, 8, 16, and 17 of the instant invention.

2. Acknowledgment is made of applicant's claim for priority under 35 U.S.C. 119(a)-(d) based upon applications filed in the Republic of Korea on November 14, 1996, December 28, 1996, and December 28, 1996. A claim for priority under 35 U.S.C. 119(a)-(d) cannot be based on said applications, since the United States application was filed more than twelve months thereafter.

Oath/Declaration

3. The oath or declaration is defective. A new oath or declaration in compliance

with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:
It does not identify the city and either state or foreign country of residence of each inventor. The residence information may be provided on either on an application data sheet or supplemental oath or declaration.

Drawings

4. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).
5. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the necessary details for generating a noise control signal based on a residual noise signal and an error variation signal as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Specifically, in Figure 7 the applicant illustrates the description, "Mixer 105c of microcomputer part 105 calculates and outputs an error signal and an error variation signal of a residual noise signal by mixing the noise signal $X(k)$ output from the system 105a with the signal $Y(k)$ output from the CRCP". However, the drawing in Figure 7 shows a mixer that combines the signal from the system 105a with the signal from the CRCP only to form residual noise signal $E(k)$.
6. The drawing in Figure 9 is objected to because it contains the unknown symbol

"XE(k)". It is suggested that "XE(k)" be changed to $-\Delta E(k)$.

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "1002", "1004", "1006", "1008", "B", or "A" (as listed on page 7 line 20 to page 8, line 1).

8. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

9. The disclosure is objected to because of the following informalities:

On page 2, lines 10-11, "for electric power simplifying" should be $-\text{for electric power amplifying}-$.

The equations on page 8, lines 3-5, are vague and indefinite because they do not contain all the necessary operators.

Appropriate correction is required.

Claim Objections

10. Claims 1 and 10 are objected to because of the following informalities:

In claims 1 and 10, "a noise control signal based a residual noise signal" should be $-\text{a noise control signal based on a residual noise signal}-$.

Correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claims 1-18 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

With respect to claims 1, 6, 10, and 15, the description on page 8, line 12 to page 9, line 3, as well as the corresponding Figure 7, presents the support for the limitations of "generating a noise control signal based [on] a residual noise signal and an error variation signal" and "a mixer mixing said noise signal and said noise control signal for generating said residual noise signal and said error variation signal". This corresponding description, however, is unclear. The applicant states that the control rule controlling part compares an input and output value (page 8, lines 12-13), more specifically comparing a residual noise signal $E(k)$ output from the mixer and a modeling value of the noise signal $X(k)$ (page 8, lines 13-16). The mixer then calculates and outputs the residual noise signal $E(k)$, as shown in Figure 7, which is then fed back to the CRCP for the aforementioned comparison (column 8,

lines 18-19). It is unclear how, as disclosed by the applicant on page 8, lines 18-19, the presented mixer can output both the residual noise signal $E(k)$ and an error variation signal $\Delta E(k)$ without an associated memory for storing the values of $E(k)$.

It is also unclear to the examiner how the "artificial sound signal $Y(k)$ " (i.e. noise control signal) is generated based on the residual noise signal and the error variation signal. On page 9, lines 12-14, the applicant explains that "the artificial sound signal $Y(k)$ is changed based on feedback of the error of the residual noise signal $E(k)$ output from the mixer 105c based on the equations discussed above". However, the equations, $E(k)=X(k)-Y(k)$, $\Delta E(k)=E(k)-E(k-1)$, and the comparison using the neural net, Figure 9, do not provide sufficient information to one having skill in the art to use this aspect of the invention. For example, Figure 9 displays a comparison based upon known inputs $X(k)$, the input noise signal, and $E(k)$ and $[\Delta]E(k)$, provided by the mixer 105c. However, using these known inputs, with the aforementioned equations, present a method for calculating $E(k-1)$ and the current $Y(k)$, but doesn't provide sufficient information on how to calculate a change in $Y(k)$ (i.e. a new adjusted $Y(k)$).

Also, with respect to claims 1 and 10, it is unclear how the current method generates/outputs a phase signal. The applicant presents a "phase perceiving part", using a transformer, rectifier, voltage divider circuit, and a band-pass filter. It is unclear how these components are included in the method pictured in Figure 6 and similarly unclear how these components alone would output a "phase signal" as

claimed. It is therefore unclear to one having ordinary skill in the art how to make/use the invention.

Claims 7 and 16 recite the components of the phase perceiving part and the corresponding method of perceiving the phase. These components and corresponding method, however, are not sufficiently described in the disclosure to enable one skilled in the art to use the invention. The specification adds no further description or implementation of these claims, but only restates the makeup of this phase perceiving part (page 7, line 20 to page 8, line 1). As noted above, it is unclear how these components act as a phase perceiving part to output a phase signal.

Claim 12 recites generating the noise control signal through the use of a look up table. This limitation is not mentioned in the specification and is not provided with any method for implementing this feature. Further, claim 3 recites, "wherein said microcomputer includes an index table". Again there is not provided in the specification, a sufficient method for using this limitation, only a mention in the description of Figure 9, which does not provide a thorough description. Figure 9 shows a neural net but does not provide how it is used to produce an index, or how/which values are arranged in the index.

Claims 2, 4, 5, 8, 9, 11, 13, 14, 17, and 18 are rejected under 35 U.S.C. 112, first paragraph, because they incorporate, and fail to correct, the faulty language present in their respective parent claims.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1, 2, 5, 10, 11, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's Admitted Prior Art in view of U.S. Patent No. 5,434,925 to Nadim.

The applicant admits as well known prior art, a conventional noise controller for actively controlling noise comprising a sensor part for perceiving the noise signal, a signal amplifying part for amplifying the perceived noise signal, a first low-pass filtering part for low pass filtering the amplified noise signal, a digital signal processor (i.e. a microcomputer part) for processing the amplified low pass filtered noise signal without phase delay, a second low-pass filtering part for low pass filtering a control noise signal from the digital signal processor, an electric power amplifying part for electric power amplifying the filtered noise control signal, and an output part for outputting the electric power amplified noise control signal (page 2, lines 1-12). The Applicant also admits as Prior Art the method of operation for the conventional noise controller as using the sensor part to perceive the noise signal, the signal amplifying part amplifying the noise signal perceived by the sensor part and outputting the amplified signal to the first low-pass filtering part, outputting the low-pass filtered

noise signal to a DSP (i.e. micro-computer) which produces a control signal, having the same amplitude but opposite phase to the noise signal, for outputting (page 2, lines 15-21). Further, since the DSP produces the control signal having the same amplitude but opposite phase to the noise signal, it is considered inherent that the DSP must first perceive the phase before producing the signal. It is also noted that since the DSP is functioning as the microcomputer, by generating a noise control signal, and a phase perceiving part, in perceiving the phase of the input noise signal, the first low-pass filtering part is outputting a filtered noise signal to both the phase perceiving part and the microcomputer part.

The Applicant's Admitted Prior Art, however, does not teach generating a noise control signal based on both a residual noise signal (i.e. an error signal) and an error variation signal in order to minimize the residual noise signal.

Nadim teaches a method and apparatus for active noise reduction in which noise from an engine is cancelled by means of cancellation noise produced by a loudspeaker driven by a controller, the difference between the noise from the engine and the cancellation noise is detected as an error signal by means of a microphone, and the error signal is applied in a feedback loop to the controller so as to control the cancellation noise produced by the loudspeaker in a manner to minimize the error signal (column 2, lines 16-23). Nadim also teaches generating the noise cancellation signal (i.e. noise control signal) using a controller, functioning as a rule controlling part, that takes into consideration both the current error signal (i.e. residual noise signal) and a change in error signal (i.e. error variation signal)

(column 3, lines 25-48 and 40-57). Further, with respect to claims 6 and 15, Nadim teaches generating an error signal by mixing the noise signal (N) with the noise control signal (C) (Equation 1) and, since the error variation signal is the difference between the current error signal and the previous error signal (equation 14), mixing the noise signal with the noise control signal also generates the error variance signal.

It would have been obvious to one having ordinary skill in the art to modify the invention of the Applicant's Admitted Prior Art to include generating a noise control signal based on both a residual noise signal (i.e. an error signal) and an error variation signal in order to minimize the residual noise signal, as taught by Nadim, because, as suggested by Nadim, the combination would have provided a method for producing an iterative reduction of unwanted noise quickly (column 5, lines 40-57) and with fewer occurrences of the apparatus being driven out of the cancelled condition (column 1, lines 31-47).

15. Claims 3 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's Admitted Prior Art in view of Nadim and further in view of U.S. Patent No. 4,630,305 to Borth et al.

As noted above, the invention of the Applicant's Admitted Prior Art and Nadim teaches many of the features of the claimed invention including calculating a noise control signal based on values of a residual noise signal and an error variation signal but does not teach using a look up table or an associated index.

Borth teaches a method and apparatus for suppressing background noise in speech communication systems by automatically selecting noise suppression gain factors (column 2, lines 47-64) wherein the gain values used in the noise suppression are obtained through use of a look up table (column 8, lines 47-51) and the look up table values are correspondingly indexed (column 11, lines 38-49).

It would have been obvious to one having ordinary skill in the art to modify the invention of the Applicant's Admitted Prior Art and Nadim to include using a look up table and an associated index, as taught by Nadim, because look up tables are a well known tool for calculating an output based on a group of known inputs and, as suggested by Nadim, the combination would have provided easy and automatic method for determining unknown values based on known values using a method that can be implemented for a variety of environmental conditions (column 3, lines 20-35).

16. Claims 4 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's Admitted Prior Art in view of Nadim and further in view of U.S. Patent No. 5,583,968 to Trompf.

As noted above, the invention of the Applicant's Admitted Prior Art and Nadim teaches all of the features of the claimed invention except for using a neural net to calculate the error signals.

Trompf teaches a speech recognition system in a noise environment using a neural network performing neural noise reduction by reducing, in a training phase, a

mapping error between noise-free vectors at an output of the neural network and noise-reduced vectors at the output of the neural network using an iterative process, and with the mapping error being further reduced by additional information which is selected from a suitable signal representation at the input of the neural network (column 1, line 61 to column 2, line 2).

It would have been obvious to one having ordinary skill in the art to modify the invention of the Applicant's Admitted Prior Art and Nadim to include using a neural net to calculate the error signals, as taught by Trompf, because a neural net is a well known tool for calculating an output based on a group of known inputs and, as suggested by Trompf, the combination would have provided a method of noise reduction, in a short amount of time, that is accurate and able to discern between the noise that is being detected for removal, as well as extraneous environmental noise (column 2, lines 8-19 and column 3, lines 51-57).

17. Claims 8, 9, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Applicant's Admitted Prior Art in view of Nadim and further in view of U.S. Patent No. 5,499,301 to Sudo et al.

As noted above, the invention of the Applicant's Admitted Prior Art and Nadim teaches all of the features of the claimed invention except for specifying that the frequency of the noise be a multiple of a base frequency.

Sudo teaches an active noise canceling apparatus and also teaches that when the frequency of a power supply is a base frequency, the electromagnetic noise due

to the power source frequency is observed to have a frequency peak at multiples of the base frequency (column 8, lines 34-41).

It would have been obvious to one having ordinary skill in the art to modify the invention of the Applicant's Admitted Prior Art and Nadim to include specifying that the frequency of the noise be a multiple of a base frequency, as taught by Sudo, because the Applicant's Admitted Prior Art teaches using the noise canceling method in a household appliance (page 4, lines 4-7) (which would inherently include a power supply) and Sudo teaches a well known fact relating the base frequency of the power supply and the frequency of the noise signal.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

U.S. Patent No. 6,233,295 to Wang teaches a segment sync recovery network for an HDTV receiver that removes residual phase and gain noise without using a digital signal processor.

U.S. Patent No. 5,727,073 to Ikeda teaches a noise canceling method comprising generating a pseudo noise signal (i.e. a noise control signal) in accordance with filter coefficients and a received inputted noise signal wherein the coefficients are generated/corrected in accordance with an error signal generated by subtracting, in a subtractor (i.e. mixer), the pseudo noise signal from the input noise signal in order to cancel/minimize the residual noise (i.e. error) signal.

U.S. Patent No. 5,408,235 to Doyle et al. teaches noise attenuation using the equation $y(n)=x(n-1)+(e(n)-e(n-1))$ produced by a feedback loop to cause a first order difference of the quantization error (i.e. $e(n)-e(n-1)$).

U.S. Patent No. 4,689,730 to Kimura teaches a flyback transformer circuit with a noise canceling circuit comprising a power source, transformer, full-wave rectifier, and a voltage regulator.

Haykin, Communication Systems, teaches a well known phase perceiving phase-locked loop that receives an input voltage and determines phase using a corresponding loop filter and voltage controlled oscillator.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

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jrw
September 8, 2002


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